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# *Indian Standard*
# GRAPHICAL SYMBOLS USED IN ELECTROTECHNOLOGY
## PART XVI AERIALS

( Second Reprint JULY 1982 )

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# *Indian Standard*
# GRAPHICAL SYMBOLS USED IN ELECTROTECHNOLOGY
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(*Continued on page* 2)

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(*Continued on page* 9)

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*Shri Y. Venkataramiah was Chairman for the meeting in which this standard was finalized.

# *Indian Standard*
# GRAPHICAL SYMBOLS USED IN ELECTROTECHNOLOGY

## PART XVI AERIALS

## 0. FOREWORD

**0.1** This Indian Standard (Part XVI) was adopted by the Indian Standards Institution on 7 December 1972, after the draft finalized by the Electrotechnical Standards Sectional Committee in consultation with the Electronic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** It is common in electrical and electronic engineering practice to employ graphical symbols to denote the various means and devices used when making diagrams of connections. The connecting devices and the points where they make contact with the apparatus may be indicated in the diagram. With the object of standardizing the symbols to meet the various needs of the electrical and electronic industry, as far as possible, based on symbols internationally agreed, a series of standards is being formulated.

**0.3** This standard is one of a series of Indian Standards on graphical symbols used in electrotechnology. A list of Indian Standards so far published in this series is given on P. 10.

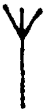
**0.4** In the preparation of this standard, assistance has been derived from IEC Pub 117-10 (1968) 'Recommended graphical symbols: Part 10 Aerials (antennas) and radio stations' issued by the International Electrotechnical Commission.

## 1. SCOPE

**1.1** This standard (Part XVI) covers graphical symbols for aerials.

## 2. GENERAL SYMBOL

### 2.1 Aerial

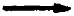


NOTE — This symbol may be used to represent any type of aerial or aerial array. The stem of the symbol may represent any type of balanced or unbalanced feeder including a single conductor. Qualifying symbols may be added to the aerial symbol to indicate polarization or direction of radiation.

## 3. QUALIFYING SYMBOLS

### 3.1 For Polarization

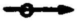
**3.1.1** *Plane Polarization*



NOTE 1 — To indicate horizontal polarization the arrow should be drawn at 90° to the stem of the aerial symbol, near the trident (*see* **4.1**).

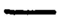
NOTE 2 — To indicate vertical polarization, the arrow should be drawn parallel to the stem of the aerial symbol, near the trident (*see* **4.2**).

**3.1.2** *Circular Polarization*

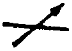


### 3.2 For Direction of Radiation

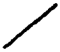
**3.2.1** *Fixed in Azimuth*



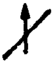
**3.2.2** *Variable in Azimuth*



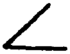
**3.2.3** *Fixed in Elevation*



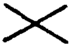
**3.2.4** *Variable in Elevation*



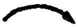
**3.2.5** *Fixed in Azimuth and Elevation*



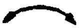
**3.2.6** *Direction Finder or Beacon*



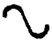
**3.2.7** *Rotating or Capable of Rotation in One Direction*



**3.2.8** *Capable of Rotation in Either of the Two Directions*

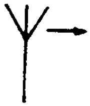


**3.2.9** *Reciprocating*

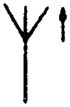


## 4. EXAMPLES OF GENERAL AERIAL SYMBOL WITH QUALIFYING SYMBOLS

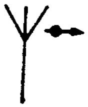
### 4.1 Aerial with Horizontal Polarization



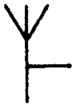
### 4.2 Aerial with Vertical Polarization



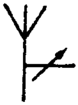
### 4.3 Aerial with Circular Polarization



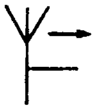
### 4.4 Aerial with Direction of Radiation Fixed in Azimuth



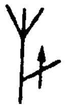
### 4.5 Aerial with Direction of Radiation Variable in Azimuth



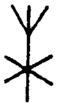
### 4.6 Directional Aerial Fixed in Azimuth, Horizontal Polarization



### 4.7 Aerial with Direction of Radiation Variable in Elevation



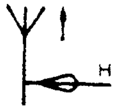
### 4.8 Direction Finding Aerial (Radio Goniometric or Marker Aerial)



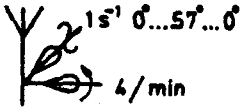
### 4.9 Indication of Lobes of the Polar Diagram of an Aerial

NOTE — If required, a drawing of the general shapes of the main lobes of the polar diagrams of an aerial may be given adjacent to the aerial symbol; further information may be added to show the direction and/or the rate of movement of the lobes.

**4.9.1** *Directional Aerial Fixed in Azimuth, Vertically Polarized, with Horizontal Polar Diagram*



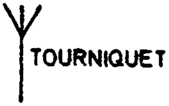
**4.9.2** *Radar Aerial, Rotating Four Times per Minute in Azimuth and Reciprocating in Elevation between 0°...... 57°......0° in One Second*



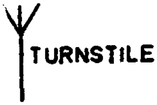
## 4.10 Supplementary References

NOTE — A name or reference may be written adjacent to the general aerial symbol.

**4.10.1** *Antenne Tourniquet*

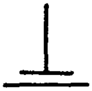


**4.10.2** *Turnstile Aerial*

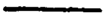


## 5. PARTS OF AERIALS

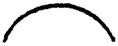
**5.1 Counterpoise**



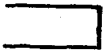
**5.2 Reflector of Director for Dipole**



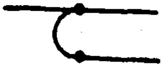
**5.3 Paraboloidal or Cylindrical Reflector**



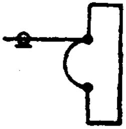
**5.4 Cheese Reflector (Cheese Box Reflector)**



**5.5 Balun**

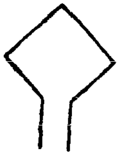


**5.6 Coaxial Pair Feeding a Folded Dipole Through a Balun**

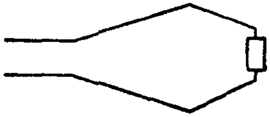


## 6. SPECIFIC TYPES OF AERIALS

### 6.1 Loop or Frame Aerial

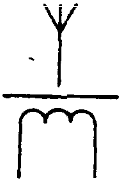


### 6.2 Rhombic Aerial



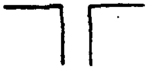
Note — Symbol shows termination by a resistor.

### 6.3 Magnetic Rod Aerial (for Example, Ferrite)

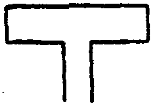


Note — If there is no risk of confusion, the general aerial symbol may be omitted.

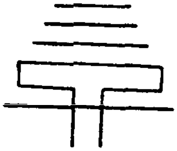
### 6.4 Dipole



### 6.5 Folded Dipole

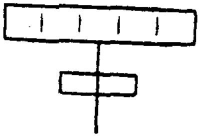


### 6.6 Folded Dipole with Three Directors and One Reflector

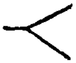


## 7. MICROWAVE AERIALS

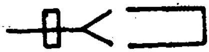
### 7.1 Slot Aerial Shown with Rectangular Waveguide Feeder



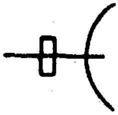
### 7.2 Horn Aerial or Horn Feed



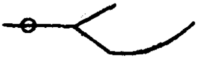
**7.3 Cheese Reflector with Horn Feed and Rectangular Waveguide Feeder**



**7.4 Paraboloidal Aerial with Rectangular Waveguide Feed**



**7.5 Horn Reflector Aerial with Circular Waveguide Feed**



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| Shri N. Srinivasan, Deputy Director (Elec tech) (*Secretary*) | Director General, ISI (*Ex-officio Member*) |

## INDIAN STANDARDS ON GRAPHICAL SYMBOLS

IS : 2032 Graphical symbols used in electrotechnology:

- IS : 2032 (Part I)-1962 Classification and definitions of diagrams and charts
- IS : 2032 (Part II)-1962 Kind of current distribution systems and methods of connection
- IS : 2032 (Part III)-1962 Circuit elements and variability
- IS : 2032 (Part IV)-1964 Rotating machines and transformers
- IS : 2032 (Part V)-1965 Generating stations and substations
- IS : 2032 (Part VI)-1965 Motor starters
- *IS : 2032 (Part VII)-1965 Switchgear and auxiliaries
- IS : 2032 (Part VIII)-1965 Semiconductor devices
- IS : 2032 (Part IX)-1969 Electron tubes and valves (other than microwave tubes and valves)
- IS : 2032 (Part X)-1969 Measuring instruments
- IS : 2032 (Part XI)-1969 Electrical installations in buildings
- IS : 2032 (Part XII)-1969 Electro-acoustic transducers and recording and reproducing systems
- IS : 2032 (Part XIII)-1971 Microwave tubes
- IS : 2032 (Part XIV)-1971 Microwave technology
- *IS : 2032 (Part XV)-1972 Aircraft electrical systems
- IS : 2032 (Part XVI)-1972 Aerials

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*Since revised.

# INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

**Base Units**

| *Quantity* | *Unit* | *Symbol* |
|---|---|---|
| Length | metre | m |
| Mass | kilogram | kg |
| Time | second | s |
| Electric current | ampere | A |
| Thermodynamic temperature | kelvin | K |
| Luminous intensity | candela | cd |
| Amount of substance | mole | mol |

**Supplementary Units**

| *Quantity* | *Unit* | *Symbol* |
|---|---|---|
| Plane angle | radian | rad |
| Solid angle | steradian | sr |

**Derived Units**

| *Quantity* | *Unit* | *Symbol* | *Conversion* |
|---|---|---|---|
| Force | newton | N | 1 N = 1 kg.1 m/s$^2$ |
| Energy | joule | J | 1 J = 1 N.m |
| Power | watt | W | 1 W = 1 J/s |
| Flux | weber | Wb | 1 Wb = 1 V.s |
| Flux density | tesla | T | 1 T = 1 Wb/m$^2$ |
| Frequency | hertz | Hz | 1 Hz = 1 c/s (s$^{-1}$) |
| Electric conductance | siemens | S | 1 S = 1 A/V |
| Pressure, stress | pascal | Pa | 1 Pa = 1 N/m$^2$ |

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